NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

LAND RECONSTRUCTION, ABANDONED MINED LAND

(Acres)

CODE 543

DEFINITION

Restoring land and water areas that are adversely affected by past mining practices and increasing the productivity of the areas for a beneficial use.

SCOPE

This standard applies to the reconstruction, grading, and reshaping of land that has been disturbed or adversely affected by past mining of all minerals and commodities.

PURPOSE

To stabilize mined areas so that they can be used to support desirable vegetation; reduce erosion and sedimentation; enhance water quality or quantity; maintain and improve the visual quality of the landscape; and protect public health, safety, and general welfare.

CONDITIONS WHERE PRACTICE APPLIES

Abandoned land that degrades the quality of the environment, prevents or interferes with the beneficial use of land or water resources, or endangers the health or safety of individuals.

Planning Considerations

Prime farmland shall not be used as a borrow area for soil reconstruction material.

Evaluate the properties of the soils, including geologic and hydrogeologic values; the quantity and quality of water; and the potential of related resources to determine their suitability for use in reconstruction operations. Consider measures for placement of soils or spoil materials; location of access roads; potential for water disposal and impoundments; measures to enhance visual resources; provisions for controlling erosion and sedimentation; practices for eliminating public health or safety hazards; and suitability of the reclaimed land for its intended use. See the guidelines contained in Section II-M (Mined Land Interpretations) of the Technical Guide for developing land use alternatives.

Land reconstruction on abandoned mined lands shall include the components necessary to reclaim and stabilize the area and prevent further degradation of air, water, soil, and plant resources. The system may consist of one or two components or several. The land reclamation standards shall be used for those components such as fire control (451) and toxic discharge control (455). Traditional practices such as terraces, grade stabilization structures, and critical area treatment components shall be used also as appropriate.

Site Preparation

Unsuitable soil material must be removed and buried so that it does not adversely affect water quality or plant growth. Boulders, other rocks, and similar materials shall be buried or otherwise placed where they do not interfere with water disposal practices, stabilization operations, and the planned use of the land. These materials must be disposed of in a manner that minimizes the potential for seepage that can pollute surface and ground water. Materials containing heavy metals must be buried to a depth below the root zone, or suitable kinds and amounts of soil amendments must be added.

Removal and Placement of Material for Final Cover

An effort should be made to reconstruct the soil with materials available on site. If feasible, soil material suited to plant growth shall be salvaged, stockpiled, and protected for use as final cover material.

The reconstructed soil must meet the minimum requirements for the specified land use on at least 80 percent of the area. The rest of the area must be in such a condition that it can be stabilized.

The salvaged material and other suitable materials must be spread over the graded areas to the depth specified in the reclamation plan. The final slope must permit application of needed conservation and management practices to keep soil losses at permissible levels. If settlement is likely to interfere with the planned use of the land, surface drainage, or water disposal, allowances must be made for the expected settlement during final grading.

Protective Measures in Areas with Highwalls and Landslides

Provisions must be made to reduce potential safety hazards and erosion and water pollution problems in areas that have highwalls and landslides. Treatment shall meet or exceed the requirements of NRCS standards for landslide treatment (453) and highwall treatment (456) as appropriate.

Water Disposal

The need for a water disposal system shall be carefully analyzed, and if needed, it shall be included in the design. The system must be intensive enough to control erosion during stabilization and after. If any practices are to be removed after vegetation is established, provisions must be made to promptly stabilize all disturbed areas. Water disposal systems suitable for erosion control on intensively farmed cropland are usually required for mine reclamation and may be used as a guide in the absence of local experience.

Landscape Resources

The appearance of the reclaimed site must be in accord with standards for maintaining and improving the visual quality of the landscape and must be compatible with the adjacent landscape. Areas of high public visibility or those offering direct or indirect human benefits shall be evaluated and considered in landscape resource management planning and design. Spoil piles and borrow areas should be shaped to blend with the adjacent landscape.

Establishment

Due to the nature of mine reclamation work, it is not always possible to achieve complete stabilization with the first effort. Provisions will be made to promptly fill and vegetate areas of excessive settlement, repair and revegetate bare spots and eroded areas, add soil amendments or replace with suitable soil materials, add plant nutrients to achieve acceptable plant development, and install any additional structural measures needed, such as terraces, lined waterways, and grade stabilization structures. The use of soil amendments (sludges, composts, fly ash, lime etc.) will be planned and approved on an individual basis.

Restoration of Borrow Area

If cover material is taken from an area outside the site, the borrow area must be graded and reshaped to ensure proper drainage and must be revegetated to control erosion.

If the cover material is taken from an adjacent farmland, the topsoil from the area must be stockpiled separately and then replaced after the land is restored for its intended purpose.

Maintenance

A plan shall be prepared that provides specific details concerning maintenance and operation of conservation practices identified in the reclamation plan. The maintenance and operation plan should specify procedures for filling areas where settlement may adversely affect drainage and land use; promptly repairing and revegetating bare spots and eroded areas; adding soil amendments to soils that cannot support adequate vegetation or replacing them with suitable material; maintaining access roads; keeping drainage structures and channels clean and functional; applying fertilizer and lime; controlling weeds; using proper grazing practices; and controlling vehicular traffic.

CONSTRUCTION SPECIFICATIONS

Areas to be graded shall be cleared of trees, logs, brush, rubbish and other materials that can prevent proper application of the practice. These materials shall be disposed of in a manner that precludes interference with water disposal practices or the operations associated with the planned use of the land.

Materials suited to growing vegetation shall be stockpiled and protected for use as final cover. Vegetation that can be saved should be properly identified and protected. Temporary seeding, mulching, water disposal, and similar measures to help control erosion should be used as necessary.

Overhanging rocks and walls that are to be covered shall be sloped ½ to 1 before the soil is placed against the wall, unless a flatter slope is needed for stability. The area shall be shaped to the line and grade shown in the plans or as staked in the field. Unless otherwise specified, fill material shall be spread in successive layers not more than 2 feet thick.

Boulders and other rocks shall be covered to the depth specified for the planned land use or stockpiled in designated areas.

After major earthmoving is completed, the cover material should be spread over the surface. The work shall be finished according to the design and to the tolerances specified in the plans.

If borrow material from areas outside the reclamation site is used, these areas must be graded, reshaped, and left as specified or shown in the plans.

VEGETATIVE SPECIFICATIONS

All areas disturbed by reconstruction will be seeded as soon as practical after final grading and resoiling are completed.

Limestone

Soil tests will be utilized to determine amount of limestone needed. A minimum of 3 tons per acre of lime or slag will be applied at a rate equivalent to Ag-ground limestone (T.N.P. 90+) except where tests call for a lower rate or when other soil amendments are used.

On spoil that will be resoiled that has a pH below 4.0, the spoil shall have 10 tons per acre of lime or slag applied at a rate equivalent to Ag-ground limestone (T.N.P. 90+) prior to resoiling. The lime or slag shall be incorporated into the spoil to a depth of 3-6 inches prior to resoiling.

Fertilizer

A minimum of 150 pounds per acre of N, P_2O_5 and K_2O will be applied per acre. When other soil amendments are used, these rates may be adjusted.

Seedbed Preparation

Seedbed preparation shall be completed within 48 hours after application of lime and fertilizer. All areas accessible to equipment shall be disked to incorporate lime and fertilizer and to prepare a seedbed a minimum of three inches deep (unless otherwise authorized in the plan). Where lime applications exceed 5 tons per acre, the lime will be applied in split applications with a minimum of one disking or equivalent treatment between applications. The final seedbed preparation operation shall be performed across the slope and immediately prior to seeding. A cultipacker, harrow, or other suitable equipment shall be used to smooth the seedbed prior to seeding. On areas inaccessible to a disk, a one-inch minimum seedbed will be prepared using suitable tillage tools, such as a clodbuster or hand tools.

When soil amendments (sludges, compost, etc.) are used procedures for seedbed preparation will be planned on an individual basis.

Seed Mixtures

Permanent herbaceous seedings will be made using one of the following mixtures based on slope steepness and the planned use of the seeded area. All seeding rates are based on seed having an 80% or higher pure live seed (PLS) rating.

When the percent purity multiplied by the percent germination gives a percentage less than 80, the rate of seeding will be increased to provide the equivalent PLS of 80. For crownvetch, alfalfa and other legumes, the percent hard seed shall be added to the percent germination in calculating the percentage of pure live seed.

All legume seed used shall be inoculated on site prior to seeding.

1. Areas subject to concentrated surface runoff (waterways, diversions, emergency spillways, etc.).

   (a) Tall Fescue 50 lbs./ac.

2. Areas steeper than a 3:1 slope and not subject to concentrated surface runoff.

(a) Tall Fescue	30 lbs./ac.
Yellow or White Sweetclover	6 lbs./ac.
Timothy	3 lbs./ac.
(b) Tall Fescue	30 lbs./ac.
Flatpea	25 lbs./ac.
(c) Tall Fescue	39 lbs./ac.
Deertongue	15 lbs./ac.
Yellow or White Sweetclover	6 lbs./ac.
(d) Tall Fescue	30 lbs./ac.
Crownvetch	20 lbs./ac.
(e) Tall Fescue	30 lbs./ac.
Birdsfoot Trefoil	12 lbs./ac.
(f) Tall Fescue	50 lbs./ac.

3. Areas graded to a slope flatter than 3:1 and not subject to concentrated surface runoff.

(a) Orchardgrass	5 lbs./ac.
Timothy	5 lbs./ac.
Yellow or White Sweetclover	10 lbs./ac.
(b) Orchardgrass	5 lbs./ac.
Timothy	5 lbs./ac.
Birdsfoot Trefoil	5 lbs./ac.
Yellow or White Sweetclover	5 lbs./ac.
(c) Orchardgrass	5 lbs./ac.
Timothy	5 lbs./ac.
Red Clover	10 lbs./ac.
(d) Orchardgrass	5 lbs./ac.
Timothy	5 lbs./ac.
Birdsfoot Trefoil	8 lbs./ac.
(e) Smooth Bromegrass	20 lbs./ac.
Timothy	5 lbs./ac.
Ladino Clover	0.5 lbs./ac.
Alsike Clover	3 lbs./ac.
(f) Smooth Bromegrass	20 lbs./ac.
Timothy	5 lbs./ac.
Ladino Clover	0.5 lbs./ac.
Yellow or White Sweetclover	10 lbs./ac.
(g) *Switchgrass	10 lbs./ac.
Big Bluestem	10 lbs./ac.
Birdsfoot Trefoil	5 lbs./ac.

4. (Optional) Where woodland or wildlife is the planned land use one of the following species may be seeded with the mixtures listed in paragraphs D-2 or D-3.

Species	Rate (Lbs. of Pure Live Seed/Ac.)	Time of Seeding
Black Locust	1-3 Lbs./Acre	Spring, Fall, Winter
Shrub Lespedeza	1-3 Lbs./Acre	Spring, Late Winter

*This seeding mixture should be seeded in April or May or dormant seeded.

Species	Rate (Lbs. of Pure Live Seed/Ac.)	Time of Seeding
Indigobush	½-1 Lbs./Acre (germination can be delayed 2-3 years)	Spring, Fall, Winter
Virginia Pine	¼-1/2 Lb./Acre (Use stratified seed in Spring; Use unstratified seed in late Fall)	Spring, Late Fall

5. Tree and Shrub Planting.

Spoil areas needing vegetative cover or needing improved cover and are not causing serious off-site sediment damage.

Species	pH Range	Recommended Spacing
White Pine	4.0 – 7.8	6 ft. x 6 ft.
Virginia Pine	3.5 – 7.8	6 ft. x 6 ft.
Loblolly Pine	4.0+	6 ft. x 6 ft.
European Black Alder	3.5 – 7	6 ft. x 6 ft.
River Birch	4.0+	6 ft. x 6 ft.
Black Oak	4.0+	6 ft. x 6 ft.
Red Oak	4.0+	6 ft. x 6 ft.
Black Locust	4.0 – 7.8	5 ft. x 5 ft.
Bristly Locust	3.5 – 7.8	5 ft. x 5 ft.
Silky Dogwood	4.0 – 7.8	5 ft. x 5 ft.
Autumn Olive	4.0 – 7.8	5 ft. x 5 ft.

See Technical Guide Section IV – Tree Planting Standards and Specifications (612) for specifications on ordering stock, planting stock size and quality, planting dates*, plant protection, root-pruning, top-pruning, and planting methods.

*Planting in Mid-February to Mid-March greatly enhances establishment on mine spoil.

Time and Method of Seeding

Seeding will be carried out as specified during the appropriate period using one of the following methods:

Method a) Drill seed approximately ¼-inch deep and cultipack or use a cultipacker type seeder operated across the slope.

Method b) Broadcast the seed and cover approximately ¼-inch deep with a light harrow, cultipacker, or other suitable equipment operated across the slope.

Method c) Apply seed with a hydraulic seeder. Immediately after seeding (only where equipment can be operated safely), cover the seed approximately ¼-inch deep with a light harrow, cultipacker, or other suitable equipment operated across the slope.

Period 1: March 15 through September 30.

Prepare the seedbed within 48 hours after spreading lime and fertilizer. The seed may be spread using one of the following methods: a, b, or c.

Cereal grain straw (preferably wheat or barley) shall be applied at 2 air dried tons per acre and anchored. When a crimper is used to anchor the mulch, the rate shall be increased to 2-1/2 air-dried tons per acre Hay mulch shall be applied at 2-1/2 air dried tons per acre and anchored. When a crimper is used to anchor hay mulch the rate shall be increased to 3 tons per acre.

Period 2: Dormant Overseeding—October 1 through November 30.

Within 6 calendar days after final grading or resoiling, the area to be seeded will have lime and fertilizer applied, the seedbed prepared, and the area mulched and anchored. Cereal grain straw (preferably wheat or barley) shall be applied at 2-1/2 tons air-dried material per acre. When a crimper is used to anchor the mulch, the rate shall be increased to3 air-dried tons per acre. When hay mulch is used, the rate shall be increased to 3 air-dried tons per acre. When hay mulch is used, the rate shall be 3 tons for both anchoring methods. Make permanent seeding using hydraulic seeder or by broadcasting over the mulch between December 1 and March 14. The seeding rates shall be increased by 50 percent.

Period 3: Dormant Method—December 1 through March 14.

If soil and weather conditions are suitable from December 1 to March 14, lime and fertilizer will be uniformly applied, the seedbed prepared, and the seed applied according to Methods a, b, or c. It is not necessary to cover the seed with a harrow or similar tool when using methods b or c during period 3. The seeding rate shall be increased by 50 percent. Cereal Grain straw (preferably wheat or barley) shall be applied at 2-1/2 tons of air-dried material. When a crimper is used to anchor the mulch, the rate shall be increased to 3 air-dried tons per acre. When hay mulch is used, the rate shall be 3 tons for both anchoring methods.

Mulch and Method of Anchoring

1. Mulch shall consist of wheat, oats, barley or hay straw and shall be applied uniformly at the rate specified under time and method of seeding and mulching. Mulch shall be applied within 48 hours after making period 1 and 3 seedings and immediately after seedbed preparation on period 2 seedings. All wire and string used in typing straw bales shall be removed from the seedbed and mulched areas.

2. Mulch shall be anchored by one of the following methods:

   (a) Asphalt emulsion at the rate of 160 gallons per acre shall be injected into the mulch as it is being applied.

   (b) A crimper shall be used across the slope to anchor the mulch. The minimum size mulch to be anchored with a crimper shall average six (6) to eight (8) inches in length.